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**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants: ANDREW D. HIRZEL

For: VOICE COIL ACTUATOR WITH PROPORTIONAL RESPONSE

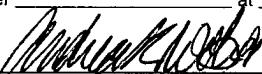
Atty. Docket:

**CERTIFICATE OF MAILING/TRANSMISSION (37 CFR 1.8(a))**

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Date: January 7, 2002

Andrea R. Wolters  
(type or print name of person certifying)

Commissioner for Patents  
Washington, DC 20231

**PRELIMINARY AMENDMENT**

Sir:

Prior to examination of this application and before calculation of the filing fee,  
kindly amend the above-identified U.S. patent application as follows:

**In the Specification:**

Kindly insert the following paragraph regarding the claim of priority for that  
currently in the application. A marked-up copy of the paragraph is attached as Appendix  
A.

— This application claims the benefit of International Patent Application No.  
PCT/US00/14139, filed May 23, 2000, which claims the benefit of U.S. Provisional  
Patent Application No. 60/142,587 filed July 7, 1999.—

**In the Claims:**

Kindly substitute the amended claims shown below for those currently pending in  
the application. A marked-up copy of the amended claims is found in Appendix B. Text  
which is added to the claims is underlined, and text which is deleted is struck-through.

1. In a voice coil actuator of the type comprising a coil, an armature, a housing and a magnet, wherein the armature is disposed at least partially within the housing and movable relative thereto and the coil and the magnet are disposed relative to each other so as to induce movement of the armature relative to the housing when the coil is energized by an electrical current, the improvement comprising:

at least one of the coil, the magnet and the housing being nonuniform in orientation relative to the armature,

whereby displacement of the armature relative to the housing will be substantially linearly proportional to electrical current flowing through the coil.

2. The voice coil actuator according to claim 1, wherein the movement of the armature relative to the housing is radial in nature.

3. The voice coil actuator according to claim 1, wherein the movement of the armature relative to the housing is axial in nature.

4. The voice coil actuator according to claim 1, wherein the coil is carried by the armature.

5. The voice coil actuator according to claim 1, wherein the magnet is carried by the armature.

6. The voice coil actuator according to claim 1, wherein the coil is a single winding.

7. The voice coil actuator according to claim 1, wherein the coil is tapered.

8. The voice coil actuator according to claim 1, wherein the housing is tapered.

9. The voice coil actuator according to claim 1, wherein the magnet is nonuniform.

10. The voice coil actuator according to claim 1, wherein the magnet is in the housing.

11. The voice coil actuator according to claim 1, wherein the magnet is radially contained in the housing.

12. The voice coil actuator according to claim 1, wherein the coil is linearly tapered.

13. The voice coil actuator according to claim 1, wherein the coil is parabolically tapered.

14. The voice coil actuator according to claim 1, wherein the coil is arcuately tapered.

15. The voice coil actuator according to claim 1, wherein the coil is discontinuously tapered.

16. The voice coil actuator according to claim 1, wherein the magnet is arcuately tapered.

17. The voice coil actuator according to claim 1, wherein the magnet is discontinuously tapered.

18. The voice coil actuator according to claim 1, wherein the magnet is parabolically tapered.

19. The voice coil actuator according to claim 1, wherein the magnet is linearly tapered.

#### **REMARKS**

Entry of the amendment for purposes of examination is requested. Any questions concerning the foregoing should be directed to the undersigned.

Respectfully submitted,

ANDREW D. HIRZEL

Dated: 7 January 2002

By: 

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